

**AMENDMENTS TO THE SPECIFICATION**

**Please replace the first full paragraph on page 9, with the following paragraph:**

A pre-decoder 100 includes a binary-coding unit 40 for binary-coding a data bit stream and respective parity symbol stream of a received turbo code, an arithmetic unit 10 for computing an estimation value of the parity bit streams as stated later, a comparison unit 20 for comparing the estimation value with the parity bit stream, a modulation unit 50 for outputting the parity symbol streams by modulating the output of the arithmetic unit 10, and a recovery unit 30 for recovering punctured parts of the parity symbol streams based on a comparison result of the comparison unit 20. The pre-decoder 100 receives through a demultiplexer (DEMUX) [[50]] 70 a signal transferred from a demodulator 60, and an output of the pre-decoder 100 is input to a turbo decoder as described later. The demultiplexer [[50]] 70 separates the signal received from the demodulator 60 into a data symbol stream  $x_k$  and parity symbol streams  $(y_{1k}, y_{2k})$ , and the separated data symbol stream  $x_k$  and the parity symbol streams  $(y_{1k}, y_{2k})$  are inputted into the binary-coded unit 40 of the pre-decoder 100.

**Please replace the second full paragraph on page 9, with the following paragraph:**

The binary-coding unit 40 is constituted with four hard limiters 40a to 40d. The data symbol stream  $x_k$  is inputted into the first and third hard limiters 40a and 40c, a first parity symbol stream  $y_{1k}$  is inputted into the second hard limiter 40b, and a second parity symbol stream  $y_{2k}$  is inputted to the fourth hard limiter 40d. Each of the hard limiters 40a to 40d binary-codes soft-values of the inputted symbol streams into +1 or [[−1]] 0, so as to generate the data bit

stream  $X_k^{\wedge}$  corresponding to the data symbol stream  $x_k$  and the parity bit streams  $Y_{1k}^{\wedge}$  and  $Y_{2k}^{\wedge}$  corresponding to the parity symbol streams  $y_{1k}$  and  $y_{2k}$ .

**Please replace the paragraph bridging pages 10 and 11, with the following paragraph:**

FIG. 4 is a view for showing a state that the pre-decoder 100 according to the present invention is connected to a turbo decoder 200. The data symbol stream  $L(x_k)$  out of the bit streams that the demultiplexer ~~[[50]]~~ 70 outputs, and the outputs  $L(y_{1k}^{\wedge\wedge})$  and  $L(y_{2k}^{\wedge\wedge})$  of the respective recovery devices 31 and 32 in the pre-decoder 100, are inputted to the turbo decoder 200. The structure of the turbo decoder 200 are the same as the conventional turbo decoder 100 which has been described with reference to FIG. 2. Accordingly, the turbo decoder 200 decodes a turbo code of the code rate  $R=1/3$  by the iteration operations as stated above and then extracts an information bit stream  $d_k^{\wedge}$ .

**Please replace the first full paragraph on page 11, with the following paragraph:**

First, the demultiplexer ~~[[50]]~~ 70 receives the data symbol stream and parity symbol streams to which channel reliability is multiplied, from the demodulator 60 (step S1), and separates a data symbol stream  $L(x_k)$  and first and second parity symbol streams  $L(y_{1k})$  and  $L(y_{2k})$  from the received turbo code, respectively (step S2). The binary-coding unit 40 in the pre-decoder 100 binary-codes the data symbol stream  $L(x_k)$  and the parity symbol streams  $L(y_{1k})$  and  $L(y_{2k})$  into a +1 or 0 value according to their magnitudes. According to this, the data symbol

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stream  $L(x_k)$  and the parity symbol streams  $L(y_{1k})$  and  $L(y_{2k})$  are changed to binary-coded data bit stream  $X_k^{\wedge}$  and parity bit streams  $Y_{1k}^{\wedge}$  and  $Y_{2k}^{\wedge}$  (step S3).

**Please delete the present Abstract of the Disclosure and replace it with the following new Abstract of the Disclosure.**

A pre-decoder applied to a turbo decoder for decoding a punctured turbo code. The turbo code consists of a data bit stream and a plurality of parity bit streams, parts of which are punctured. The pre-decoder has an arithmetic unit for calculating ~~an estimation value of the~~ estimated parity bit streams by carrying out, ~~a same algorithm~~ with respect to the data bit stream, the same algorithm ~~which is~~ used by a turbo encoder to produce the parity bit streams, a comparison unit for comparing the plurality of parity bit streams with the ~~estimation value~~ estimated parity bit streams, and a recovery unit for substituting ~~the punctured bits of the parity bit streams for bits of the estimation values corresponding to the~~ estimated parity symbols for corresponding punctured parts of the parity symbol streams when ~~the respective~~ related non-punctured bits of the parity bit streams are identical with ~~the bits of the estimation values~~ corresponding to the punctured parts corresponding estimated non-punctured parity bits. The punctured parity symbols are recovered by the pre-decoder completely, or at least partially, and provided to the turbo decoder. Accordingly, the decoding performance of the turbo decoder is enhanced.